ABSTRACT

An object of the present invention is to reduce the resistance of an electrode of a Group III nitride semiconductor. A thin Si film and a thin Ti film are formed selectively in a contact formation region on a surface of an AlGaN layer as a Group III nitride semiconductor layer formed on a substrate, and the resulting substrate is heat-treated at a high temperature. By the heat treatment, Si is diffused into the AlGaN layer in the ohmic contact formation region at a concentration of about 10^{20} cm^{-3}. Further, an electron density sufficiently high to provide an ohmic characteristic through a reaction between Si and Ti is provided. Thus, a low resistance $TiSi_2$ portion resulting from the reaction between Si and Ti, a TiN portion resulting from a reaction between Ti and AlGaN and a Group III metal portion of Ga and Al devoid of nitrogen are formed in the contact formation region thereby to provide a low resistance electrode film mainly comprising $TiSi_2$.